REMARKS

1) The Examiner has rejected claims 1-2, 4-12, 14-17, and 20 under 35 U.S.C. 103 over U.S. 6,107,240 to Wu et al., optionally in view of U.S. 5,137,862 to Mackrodt, et al. and U.S. 5,413,984 to Marecot et al.

The present invention relates to a catalyst for treating diesel exhaust gas. In particular, it claims a combustion catalyst for treating a suspended particulate matter in a diesel exhaust gas, wherein said combustion catalyst comprises: a carrier consisting of a *ceria-praseodymium oxide-lanthanum oxide*; and a precious metal or an oxide thereof as a catalytic component loaded on the carrier.

Wu relates to a catalyst suitable for the treatment of automotive engine exhaust. Specifically, it relates to a catalytic composition containing an oxygen storage component (OSC) which is an "intimately mixed" oxide of ceria and praseodymia. The structure taught by Wu includes a catalytic metal component such as platinum dispersed on a support such as activated alumina. The structure further includes the OSC material which is segregated from the catalytic metal component on the support, and may optionally have dispersed thereon a limited amount of a second catalytic metal component. The Examiner thus asserts that the OSC material *itself* serves as a support and thus obviates the presently claimed invention. Applicants respectfully submit that this is not the case.

While Wu's OSC material may contain platinum or the like thereon, it is submitted that Wu et al. still *fails* to teach or suggest the specific carrier materials required by the present claims. First, the Examiner takes that position that since that the presently claimed combustion catalyst *comprises* a carrier, it leaves the present claims open to other carrier materials. However, it is submitted that since this carrier is specifically required to *consist of* a ceria-praseodymium oxide-lanthanum oxide, the Wu reference must be found to teach or suggest this required combination in order to support a finding of obviousness. It is submitted that Wu fails to disclose the *exact* carrier materials of the

presently claimed invention. In addition, nothing in Wu et al. provides any motivation for forming a ceria-praseodymium oxide- lanthanum oxide carrier.

Wu discloses an oxygen storage component (OSC) which includes an intimately mixed oxide of ceria, praseodymium, and certain other optional materials such as yttrium and neodymium. However, lanthanum oxide is not disclosed. The Examiner asserts that it would have been obvious to substitute lanthanum for another rare-earth metal of Wu. However, it is submitted that the presence of lanthanum oxide in the claimed invention provides unexpected benefits which are not addressed or contemplated by the invention of Wu. Specifically, as stated throughout the present specification, it is preferable that the catalysts of the present invention preferably exhibit an effective temperature, or combustion temperature, which is lower than 350°C (see p. 3, lines 13-16), such that they are suitable for low-temperature combustion applications. While this temperature is not required by the present claims per se, it is a desirable characteristic which is surprisingly shown by the data below to be directly linked to the presence of *lanthanum* in a ceria-praseodymium oxide carrier supporting a precious metal.

Example 11 of the present invention show the results of a ceria-praseodymium oxide-lanthanum oxide carrier having platinum carried thereon, which exhibits a combustion temperature of 320°C. This is compared to a conventional Al_2O_3 carrier having platinum thereon according Comparative Example 1, which exhibits a combustion temperature of 580.2°C as shown in Table 6. Thus, Example 11 shows that the inventive carrier exhibits a lower combustion temperature in comparison to the Comparative Example which uses the same catalyst metal. Example 12 goes on to show further low combustion temperature results using ceria -praseodymium oxide-lanthanum oxide carriers having iridium carried thereon in various amounts. Applicants submit that the materials taught by the cited art does not exhibit these desired combustion temperature results of the present invention. Further experimentation has been conducted by the inventor, and the resulting data is shown in the table below:

Invention	Carrier	Precious Metal	Active Temp.
Present Invention	Ce-La-Pr	Ir (1%)	340 °C
Wu et al.	Ce-Y-Pr	Ir (1%)	380 °C
Wu et al.	Ce-Nd-Pr	Ir (1%)	389 °C
Mackrodt et al.	Ce-La-Pr	NONE	425 °C
Mackrodt et al.	Ce-Y-Pr	NONE	430 °C
Mackrodt et al.	Ce-Nd-Pr	NONE	445 °C

The additional experiments based on Wu were conducted such that a precious metal catalyst is supported on a carrier having rare-earth metals other than lanthanum (i.e. yttrium and neodymium as disclosed in Wu) mixed with ceria-praseodymium oxide. The results show that the presently claimed Ce-La-Pr carrier, having iridium thereon, exhibits an effective temperature of 340°C, which is below the preferred 350°C limit as disclosed throughout the specification. In contrast, the results using carriers formed with the rare-earth metals disclosed in Wu, namely yttrium and neodymium, having iridium thereon exhibited effective temperatures of 380°C and 389°C, which are well above the desired 350°C limit. Thus, the above data shows that where it is preferable for the effective temperature to be suitable for low-temperature combustion applications, yttrium and neodymium unsuitable to be mixed with a ceria-praseodymium oxide carrier. In contrast, the data shows that lanthanum provides a surprising benefit when combined with ceria-praseodymium oxide, which would not have been expected by one of ordinary skill in the art. The additional experiments based on Mackrodt et al., where <u>no</u> precious metal is supported on a carrier having rare-earth elements mixed with ceria-praseodymium oxide, will be discussed in detail below.

Furthermore, Applicants point out that due to the "consisting of" language of the present claims, other rare-earth metals such as yttrium and neodymium are effectively *excluded* from the carrier materials of the claimed invention. As stated in MPEP §2111.03, the transitional phrase "consisting of" excludes any element, step, or ingredient not specified

in the claim. *In re Gray*, 53 F.2d 520, 11 USPQ 255 (CCPA 1931); *Ex parte Davis*, 80 USPQ 448, 450 (Bd. App. 1948). Therefore, no other materials may exist in the presently claimed carriers except for a ceria-praseodymium oxide-lanthanum oxide. Thus, Wu's optional inclusion of yttrium or neodymium expressly teaches away from the presently claimed invention.

For all of the above reasons, it is submitted that nothing in Wu would inspire one of ordinary skill in the art to formulate a carrier consisting of a ceria-praseodymium oxide-lanthanum oxide, with a precious metal or an oxide thereof as a catalytic component loaded on the carrier, as required by the present claims.

Regarding Mackrodt et al., this reference discloses a catalyst where ceria, praseodymium, oxide, and lanthanum oxide have been mixed. However, this reference fails to disclose the supporting of a *precious metal* on their carrier. As shown in the data table above, additional experiments were conducted where no precious metal is supported on a carrier having rare-earth elements mixed with ceria-praseodymium oxide. The results using carriers formed with a variety of rare-earth elements but which had *no* precious metals supported thereon exhibited effective temperatures of 425°C, 430°C, and 445°C, which are well above the desired 350°C limit. It is submitted that Mackrodt's use of a different catalyst results in the performance of a different reaction than the present invention. Furthermore, the support of a precious metal is essential to the present invention. Where rare-earth elements have merely been mixed will not contribute to a low effective temperature. Thus, Mackrodt is not at all useful for the formation of a catalyst suitable for the purposes of the present invention, namely where soot in an exhaust gas is to be combusted for purification. In fact, nothing in Mackrodt discloses any use in the field of exhaust purification at all.

Marecot is next cited by the Examiner for teaching the use of multiple catalyst metals. However, Applicants submit that Marecot still does not fill the voids of Wu and Mackrodt. That is, whether or not Marecot teaches multi-metal catalysts, it still does not add anything to the cited art which would be sufficient to obviate the specific makeup of

the presently claimed carrier composition which *consists of* ceria-praseodymium oxide-lanthanum oxide. In addition, Marecot also fails to teach carriers which include both praseodymium *and* lanthanum. Thus, it is urged that even a hypothetical combining of Wu, Mackrodt, and Marecot would still fail to obviate the presently claimed invention.

In addition, it is urged that while certain individual additional features of the dependent claims 2, 4-12, 14-17, and 20 may be separately known in the art, these claims all relate to *narrower* embodiments of the invention disclosed in claim 1. Applicants therefore submit that where claim 1 is sufficiently inventive in view of the cited art for the reasons argued above, all claims depending therefrom should be considered inventive as well. For all of the above reasons, it is respectfully submitted that the above rejection over Wu, Mackrodt, and Marecot should be withdrawn.

2) The Examiner has rejected claim 13 under 35 U.S.C. 103 over Wu et al., optionally in view of Mackrodt, et al. and Marecot et al. as cited above, and in further view of U.S. 6,455,182 to Silver. Claim 13 provides an embodiment of the present invention wherein the combustion catalyst comprises silver, in a loading ration of ruthenium to silver which is from 1:10 to 10:1. The Examiner agrees that the previously cited references fail to disclose the use of silver as a catalytic metal. Thus, the Examiner further cites Silver '182 in an attempt to fill this void. However, Applicants respectfully submit that that whether or not the Silver '182 reference discloses the use of silver as a catalyst metal in general, it still fails to cure the defects of the above cited art.

The arguments regarding Wu, Mackrodt, and Marecot are repeated from above and apply equally here. Specifically, Wu fails to teach the presence of lanthanum, and thus fails to teach or suggest a carrier which *consists of* a ceria-praseodymium oxide-lanthanum oxide. Mackrodt fails to teach the presently claimed carrier having a *precious metal* supported thereon, and thus results in a completely different catalyst and a different resulting reaction than the presently claimed invention. Finally, Marecot fails to cure the defects of Wu and Mackrodt, and further fails to teach a carrier which includes both praseodymium *and* lanthanum.

Regarding Silver, it is submitted that this reference not only fails to overcome the deficiencies of Wu, Mackrodt, and Marecot, but it also *expressly* teaches away from the presently claimed invention and thus would not have been obviously combined with the above cited art in an effort to devise the presently claimed invention.

That is, Silver fails to teach or suggest a carrier composition which include oxides of both praseodymium *and* lanthanum. Rather, Silver reference discloses a tertiary combination of ceria, zirconia, and *a third metal oxide* which is one of praseodymium oxide, lanthanum oxide, neodymium oxide, or hafnium oxide, to form a ternary mix of the metal oxides (see col.2 line 65 through col.3 line 3). None Silver's embodiments teach or suggest the inclusion of *both* praseodymium oxide and lanthanum oxide in their carrier compositions, as presently required. Furthermore, since Silver specifically relates to a *tertiary* combination which must already contain ceria and zirconia as two of its three components, it is urged that the carrier composition of Silver could not possibly contain both praseodymium oxide *and* lanthanum oxide, as presently required. In addition, while zirconia is a required component of Silver's carrier compositions, the wording of the present claim 1 effectively *excludes* zirconia from the inventive carrier compositions. Again, the present claims state that the inventive catalyst carrier consists of a ceria-praseodymium oxide-lanthanum oxide. All other materials are excluded therefrom. Thus, whether or not certain precious metals are taught by Silver, this reference fails to cure the defects of Wu, Mackrodt, and Marecot, and fails to obviate the present claims.

The undersigned respectfully requests re-examination of this application and believes it is now in condition for allowance. Such action is requested. If the Examiner believes there is any matter which prevents allowance of the present application, it is requested that the

undersigned be contacted to arrange for an interview which may expedite prosecution.

Respectfully submitted,

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